Salt-Water Sweetned:

Or, a TRUE

ACCOUNT

OF THE

Great Advantages

Of this NEW

INVENTION

BOTH BY

Sea and by Land:

TOGETHER

With a Full and Satisfactory Answer to all Apparent Difficulties.

ALSO THE

Approbation of the COLLEDGE of PHYSICIANS

LIKEWISE

A LETTER of the Honourable *Robert Boyle* to a Friend upon the same Subject.

December 22th. The Third Edition, with Additions.

LONDON,

Prined for *William Cadman*, at the *Poves-Head* in the *New-Exchange* in the *Strand*. MDCLXXXIII.

TO THE

KING'S Moſt Excellent Majeſty.

SIR,

WHEN Mr. Boyle, *with my Partners, and my ſelf attended your Majeſty with the Experiment of Reducing* Salt Water *into* Freſh; *your Majeſty ſeem'd ſo well pleaſed with an Invention of that Univerſal Benefit, that We cannot but with our Humbleſt Duty, acknowledge your Gracious Reception of it; However as your Great Wiſdom and Judgement is not eaſie to be ſurpriz'd, and your Royal Approbation never known to be your haſty Act of Grace; your Favour and Patronage was not fully obtain'd, till with the ſtricteſt Scrutiny you had firſt examin'd thoſe Hopes and Probabilities, you vouchſaf'd to incourage in Us.*

But when upon further conſideration, We had obviated all Difficulties, and ſolv'd all Objections againſt this Undertaking, (which We hope will appear in this Printed Paper,) *your Majeſty was Graciouſly pleas'd to give us your Approbation, and to Order Us your* Letters Patents, *which Grace and Favour, ought to be, and is receiv'd by Us with the deepeſt ſenſe of our humble Acknowledgements and Gratitude.*

And if the Fruits of your Royal Grant has not hitherto been derived to Us, 'tis partly by ſome Obſtacles we met from the ſuggeſtions of a private Perſon, but more eſpecially by the late Horrid

 Conſpiracy

Conſpiracy, *when, not only our Loyal apprehenſions for Your Majeſties Danger, diverted our Thoughts from all other Concerns, but likewiſe we judged it a part of our Duty not to be preſſing on your Majeſties Goodneſs, or on your Miniſters of State in ſo Important a juncture of Affairs: But having now re-gained Leiſure and Freedom after the diſſipation of the greateſt part of our Fears, We preſume a ſecond time to lay theſe Endeavours at your Feet, as beſt Entituled to the Patronage of ſo great an Undertaking by Your own Subjects, and beſt able to Recommend it to the World by your Royal Appprobation.*

This Experiment is in a great degree owing to the Eminent Mr. Boyle, *and indeed well worthy ſo Ingenious a Promoter, being ſo much the more the Favorite of this happy* Genius, *as it is Univerſally uſeful to Mankind; But whatever Advantages this Country, or indeed the World may receive by it, his whole Ambition is bounded in the publick Profit, contenting himſelf with no other Benefit from it, than the ſatisfaction and pleaſure of ſeeing it accompliſh'd by his Friends.*

The advantages in regard to Navigation, *eſpecially in long Voyages, which are ſubject (through often Calms, and on ſeveral other accounts,) to diſtreſs, for want of Water, and the benefits to Sea-Towns, which are incommodated by Brackiſh Waters, Together with the Eaſineſs, Cheapneſs, and Wholeſomneſs of this prepared Water, are the principal ſcope of theſe enſuing Papers, which are Humbly Dedicated to your Majeſties Peruſal, Favour, and further Approbation, by*

Your Majeſties moſt Dutiful, and

Obedient Subject,

R. FITZGERALD.

The fore-going Dedication Humbly offered to His Majesty, *having discovered the Intention of this Undertaking; it remains now to satisfy all Reasonable Scruples which have been raised concerning the Wholesomness and Cheapness of* Water *thus Prepared.*

The *Queries* and *Answers* follow.

Quest. 1. IF *this* Water *can be made in sufficient quantities to serve the Uses of any Ship at Sea?*

Ans. About Ninety Gallons may be Prepared in every Twenty Four Hours by an Instrument of 33 Inches Diameter, which will stand under the Deck of any Ship; and it's computed that less than 3 Quarts is a good Allowance for any man in that time: And if a large Ship, wherein there are many men aboard should require more Water, then two or more of the Instruments may be had upon reasonable Terms, and one may attend several of them.

Quest. 2. *In case the Operation be by* Fire, *it may require a Skilful* Chymist, *or one knowing in such Operations, to be on Board every Ship, who will require great Wages.*

Ans. There will be no occasion for any such Person, for any Sea-man may be Instructed in an Hour or two to Prepare this Water.

Quest. 3. *It's probable that the* Engine *may be frequently out of Order, and being so at* Sea *where Artificers and Tools are wanting to Repare it, there must necessarily follow want of* Water, *which will be of Ill Consequence.*

Ans. This *Engine* is of such Contrivance, that it's never likely to be out of Order.

Quest. 4. *Can this* Engine *be of use in Stormy-Weather?*

Ans. Since a sufficient quantity of Fresh-water may be so easily had by this *Engine*, the Mariners will be Careful to make a good Provision of it before-hand; however 'tis not to be doubted but it will answer the worst Accidents of the greatest Storms, and have its Effect sufficiently in the worst Weather, especially considering that in such desperate Extremities men must be content with smaller Allowances.

Quest. 5. *The Operation being by* Fire *it may endanger the Ship, and the Smoak be very offensive?*

Ans.

Anſ. The *Engine* may eaſily be placed in any Ship without danger of *Fire*, or offence of Smoak.

Queſt. 6. *Will not the Charge of this Inſtrument and the Materials belonging to it be very great?*

Anſ. It is difficult to make exact Anſwer to this, but an Inſtrument of the largeſt Size, with all the Materials belonging to it, will not amount to above Sixteen pound at moſt, and may laſt many years, and according to the Rates of Ships they may be proportion'd both in Bulk and Price. And where it may be thought Neceſſary to make uſe of this Experiment on Shore, for Brewing, or other uſes of a Family, Inſtruments and Materials may be very Large, and very much cheaper on Shore, then at Sea.

Queſt. 7. *Will not the Fewel be very Chargeable, and take up much Room in the Ship.*

Anſ. This Operation is cauſed by ſo little *Fire*, that it will be very Cheap, and the Proviſion need not be great, nor the trouble of Stowing it in a Ship.

Queſt. 8. *Will not the Ingredients take up much Room, and be very Chargeable?*

Anſ. A Veſſel leſs then a Barrel may contain enough of the Ingredients to carry a Ship to the Eaſt *Indies* and back again; and the Ingredients for one hundred Gallons of this *Sea-Water* will not amount to above fourteen Pence at moſt. And will be cheaper when great quantities are us'd at Land.

Queſt. 9. *Admitting this Preparation of Water may be made, and in ſufficient quantities, it may be doubted whether it be wholeſome?*

Anſ. The Famous Lord *Bacon* having written Learnedly of this Subject, had not the leaſt thought that the Sea-Water after it had been Diſ-ſalted, without any Noxious addition, was Unwholeſome: and it neither now is, nor ever was really doubted whether it where wholſome: However, becauſe invidious Perſons, who are no well-wiſhers to Ingenious Deſigns, may poſſibly raiſe Scruples, the Gentlemen who are concern'd in this Grant, have purpoſely, to give Publick Satisfaction, ſent a large quantity of this Water to Doctor *King*, a very Ingenious Phyſician, who is a Member of the *Colledge*, and of the *Royal Society*; who finds,

1. That it is Lighter than moſt of the Waters about the Town.
2. That it is without Sediment, and Tranſparent as any other Waters.
3. That it Lathers, (as they call it,) with *Waſh-Ball* or *Soap*, better than other Water, and with leſs *Soap*.
4. That *Sugar* diſſolveth ſooner in it, than in other *Water*.
5. That it *Evaporates* ſooner than common *Water*.
6. That whereas common *Water* Putrifies and yields a Stinking Smell within a few Weeks, this has continued Sweet and unaltered ſeveral months,

months, and may yet do ſo much longer, being ſtill in as good condition as it was above Eight months ago, *November* the 15*th*. 1683.

7. That it makes *Gellies* as firm and good as any *Water*.

8. That it Boils Peaſe to Tenderneſs, Beef, Mutton, Fiſh, and all other Meat, without giving it an ill *Taſte* or *Colour*.

9. That it has no kind of ill *Taſte* in it ſelf, and Boils in *Milk* without Curdling.

10. That *Flowers*, *Plants*, and all *Vegetables* grow in it at leaſt as well as any other *Water*.

11. And that ſmall *Animals* Live and grow in it.

Several men of great Quality, *viz.* The Earls of *Shrewsbury*, *Weſtmorland*, *Mulgrave*, the Lord *Dunbar*, Lord *Lumley*, Lord *Falconbridge*, and Lord *Chumley*, beſides ſeveral Gentlemen of Quality who frequently drink Water, Officers of *Sea* and *Phyſicians* have *Drunk* of this *Water* without being in the leaſt indiſpos'd after it; but leſt any doubts may remain after this, of the *Salubrity* of the ſaid *Water*, the following Teſtimonial of theſe Learned and Eminent *Phyſicians* is here inſerted. And a further account of new Experiments made by an Ingenious *Phyſician*, is now ready to be Printed.

The Approbation of the Colledge of Phyſicians, *and of other* Doctors *of* Phyſick, *Practiſing in and about* London.

WHereas we have received an account in a *Gazet* publiſhed ſome months ſince, that the Honourable *Robert Fitz-Gerald* Eſq; hath found out the way and means of reducing *Salt-water* into Freſh, in quantities ſufficient to ſerve Ships at Sea. And for as much as ſome Perſons may poſſibly make a doubt, if the ſaid Water be wholeſome after the Salt is taken out of it. We therefore conſidering of what general advantage, this uſeful Experiment may be, having fully inform'd our ſelves from Mr. *Boyle*, that the ſaid Experiment is made by Fire. And having alſo ſeen an account of ſome Experiments made by ſome Members of our own Body, do declare our Opinion, that We believe the ſaid Water is very wholeſome, and may be ſafely uſed. And being further acquainted by the ſaid Mr. *Boyle*, that the very few Ingredients made uſe of in the ſaid Operation, are fixed in the Fire, and give no noxious quality to the Water; We are therefore of Opinion that the ſame may

be

be safely used, and is at least as Healthy as any othe Waterr us'd at Sea. All which We certify (at the Request of the Honourable *Robert Fitz-Gerald.*)

D. *Cox* President,
Sir C. *Scarborough* Knt.
Dr. *Daniel Whistler*,
Dr. *Wheatherly*,
Dr. *Will. Denton*,
Sir *T. Millington* Knt.
Dr. *Walter Needham*,
Dr. *Thomas Short*,
Dr. *Thomas Allen*,
Dr. *Edmond Dickingson*,
Dr. *William Croone*,
Dr. *Richard Lower*,
Dr. *John Windebank*,
Dr. *Daniel Cox*,
Dr. *James Rusine*,
Dr. *Charles Conquest*,
Dr. *Edmund King*,
Dr. *Willoughby*,
Dr. *Thomas Sydenham*,
Dr. *Edward Tyson*,
Dr. *Nehemiah Grew*,
Dr. *David Abercromby*,
Dr. *Andrew Creagh.*

Though Physick has always Flourished in thisKingdom, yet in this Age it is in greater Perfection then ever; being improv'd both as to the Practical and Speculative part, by the present Fellows of the Famous Colledge of Physicians; who being Men of great Practice and Eminent Learning, cannot but give full satisfaction to all such as inquire concerning the healthfulness of this Water; Their Opinion being in this particular, the more valuable, because it is to their own disadvantage; since the Brackish Waters of the Sea-Coast, and the putrifying Waters made use of at Sea, might probably have afforded them a great number of Patients, which may hereafter be lessened by the use of this wholesom Water.

Since the first Edition of these Papers his Majesty has been pleas'd to see some Experiments, which has so convinced His Majesty of the healthfulness of this Water, that he has resolved to have it generally made use of in his Sea-Port Garrisons; of which an account has been given in several *Gazets*, by His Majestics Special Order.

The Benefits and advantages of Sea-Water *made* Fresh.

MUch Stowage will be saved, so that a Ship of 50 or 60 Tun, and proportionably of greater Bulk, may take in several Tuns of Goods more than they formerly used to carry; which will considerably advance the Trade of all Merchants, and be of vast profit to the Masters or Owners of Ships.

The Charge of Casks is very considerable, especially when bound with Iron,

Iron, as all Sea-Casks muſt be; And by means of this Engine, three fourths of that charge will be ſaved.

The tear and wear of Boats often going from Ship-board, and frequent loſs of the Boats and men in Stormy weather, and the opportunity of the Sea-mens being Drunk on ſhoar; by which many fatal accidents do happen, (by means of having this Water-Engine) will be prevented.

Ships in long Voyages have been forc'd to run many Leagues from their intended courſe, which much retards their Voyage, and makes them loſe fair winds, and maintain more Sea-men at charges of Diet and Wages than they have occaſion for; which inconveniences may be prevented by having Water within themſelves.

Ships are often forc'd to leave their Ancors and Cables behind them, by being forced into dangerous Shoars upon account of taking in Freſh Water.

In the *African*, *Eaſt* and *Weſt India* Voyages, great quantities of Freſh Water are neceſſary, which the Sea-men are forc'd to put above Deck for want of room, which is great hindrance to a Ships Sailing, and much endangers and weakens a Ship.

In caſe of Calms, which often happen in the narrow Seas, but eſpecially near the Line, this Inſtrument will be of vaſt Advantage, by affording freſh and wholſome Water, inſtead of that which is unwholſome and offenſive.

Eſſex, *Kent*, and all other the Sea-Coaſts, in any part of the World, that want wholſome Water, may be eaſily and cheaply ſupplied by this means; as alſo *Venice*, *Amſterdam*, *Roterdam*, and all other Towns or Places that lye near the Sea, and either want good, or have Brackiſh Water.

In time of War, whole Navies may be relieved by this Engine, and opportunity given of making the greateſt diſcoveries imaginable.

It is further to be conſidered, that hitherto the richeſt and ableſt bodied Sea-men have been averſe from undertaking long Voyages, by reaſon of endangering their healths, and lives, by making uſe of putrified Water, which inconvenience is not now to be feared, there being ſuch uſeful hopes of Freſh Water by the uſe of this Engine; and poſſibly a ſmaller number of men may ſerve the uſe of Ships than do at preſent, by which much Charges will be ſaved to the Maſters and Owners of Ships; and Merchants may Trade upon eaſier Terms.

In *Portſmouth*, *Rocheſter*, the *Fenns* of *Lincolnſhire*, and any other places near the Sea, where Waters are Brackiſh, and conſequently unwholſome, this Engine, *&c.* may be very uſeful, and where there is room enough to place it, very great quantities of Water may be had for the uſe of whole Families, and the Ingredients when uſed in great quantities may be afforded at a Cheaper Rate.

A LETTER of Mr. BOYLE's, to the Learned Dr. JOHN BEALE, Fellow of the Royal Society, concerning *Fresh-water* made out of *Sea-water*: Printed at the desire of the *Patentees*.

SIR,

TO give you a short account (suitable to the little time I have to do it in,) of the Transaction, which I suppose must have given the rise to the mention made of my Name in the publick Gazette: I must inform you, that one of my nearest Relations, (Captain Fitz-Gerald,) and some other Worthy Gentlemen, having acquainted His Majesty, that They had an Invention for making Sea-water sweet and wholsom in great quantity, and with small Charge, and that I had examin'd, and did approve the Water so prepar'd; His Majesty was pleas'd with very Gracious Expressions, to command Me to attend Him with a further and more particular Information. Having readily obey'd this Order, and been made acquainted with the Objections the King thought fit to make against the Practicableness of the Invention; which, (tho a private Man had urg'd them,) I should think the most Judicious that have been fram'd against it; I Humbly represented to him, that I look'd upon this Invention as Comprizing two differing things; a Mechanical part, which related to the Engine it self, and the use of it a Ship-board, and a Physical part, which concerns the Potableness and Wholsomness of the Liquor. About the former of these I did not pretend to cleer the Difficulties, especially such strong ones, as His Majesty had propos'd; but left it to the Patentees to give Him Satisfaction, which they were in a readiness to offer. But as to the VVholsomness of the prepar'd VVater, I had made some Tryals upon that Liquor, which gave me no just grounds of suspecting it to be unwholsome, but several motives to believe it well condition'd, and of great use to Navigators, and not to them only. And having hereupon briefly acquainted His Majesty with the chief Tryals I had made to examine this Sweetned Water, He was pleas'd to look upon them as Satisfactory, and vouchsafed on that occasion to discourse as a Virtuoso, of the Sea and Brackish-VVaters, and gave me some new, as well instructive Observations about them: and in conclusion, dismiss'd the Patentees with a Gracious Promse of His Royal Protection, and peculiar Favour.

To this short Narrative it now remains, that I briefly Subjoin the chief things that perswaded me of the Salubrity of this Water, (whence may be justly and easily

easily Inferr'd, the Utility the Publick may receive by a cheap and easy way of preparing it.) First, then I consider'd that almost all the Rain-water that falls from the Clouds on the Main Ocean, and which (except perhaps in very few places in torrid Climates) is unquestionably receiv'd as wholesom, must be afforded by the Sea, and consequently be but Sea-water free'd from its Salt (according to the Famous Motto, Redit Agmine dulci.) Next I found, (as His Majesty Himself had done,) that the Liquor was well tasted and without any sensible Brackishness; and so some of it continued for between 4 or 5 Months in a large Crystal Bottle, that I purposely kept unstopt, and for the most part in a South Window, where it neither did, nor probably in a long time, will putrifie, or so much as appear troubled or less transparent; during which time it was with Approbation tasted and smell'd by several Learned Physicians of the Famous Colledge of London. Thirdly, I found it laver very well, which most Pump-waters, and many others that have some little (tho' unperceiv'd) common Salt in them, will not do. Fourthly, this Water will boyl Pease tender, which amongst Sea-men is one of the principal signs of good Water. Fifthly, In very good Ballances, with an Instrument that I purposely caus'd to be made for the nice weighing of Liquors, I found this Water far less heavy than one would expect, for if it differ'd at all in weight from the like quantity of undistill'd Water, (I speak with an If, because it is far more difficult to be exact in such nice Tryals, than the unpractic'd will imagine) the difference was not considerable, being but one part in 400, and that difference is very small in comparison of that which Navigators and Learned Authors relate to be observable in natural Waters, all of them good and potable: I might tell you on this occasion, that the last Great Duke of Tuscany, who was an Eminent Virtuoso, and the Patron of the celebrated Academy of the Lyncean Philosophers, is affirm'd, among other prudent courses that he took for his Health, whereof he was very Sollicitous, to have constantly made use of Distill'd Water when he us'd any Water for his own Drinking. And I could add other things favourable enough to the Patentees Water, if Haste and perhaps Discretion too, did not oblige me to leave them yet unmention'd, that I might now have time to say somewhat of the main thing of all that convinced me of the Saltlessness of the Water I speak of. I consider'd then, Sixthly, That the thing that was aim'd at by those Ingenious men, that at differing times, and in several Countries have attempted to make Sea-water Sweet, and the thing that was requir'd by proposing Recompences, or otherwise to Encourage the Makers of such Attempts, was to Free the Sea-water from the Brackishness without any Noxious Additament: so that on all sides it was taken for granted, that the only thing that kept the Sea-water from being safely Potable, was its Brackishness. From which Reflection it was natural for Me to infer a Conclu-

sion very favourable to our prepar'd Water: For having long since written a short Discourse of the Saltness of the Sea; *I had been industrious to devise ways of comparing Waters in point of Brackishness. And by these I found the* Patentees *Water to be more free from Common-salt, than Waters that are usually drunk here in* London, *of which I remember I shew'd those Gentlemen an Experiment that surpriz'd, as well as convinc'd them. And that which more satisfi'd me my self, was a Tryal that I carefully made by a way which having mention'd, but not yet (for want of opportunity) disclos'd to His Majesty, the Respect I owe Him forbids me to impart without His leave: On which account I hope you'd be content to be at present assur'd, of these two Things; One, that by this way of Tryal, I found, (what possibly you will think strange;) that if there were in Water, so much as one Grain of Salt, in above two Ounces of Water, I could readily discover it: The other, that even by this Critical* Examen, *I could not detect so much as a Thousandth part of Salt in Our Prepar'd Water; whereas I found by Tryals purposely and carefully made, that our* English *Sea-water contain'd a* 44, *or* 45th *part of good dry Salt; or, which is all one, that* 44 *Pints, or near so many Pounds of* Marine *Water, would yield about one Pound of dry Common-Salt.*

Thus Sir, *you have a short and Art-less Account, such as my haste will permit, and the nature of the Subject requires, of my part in promoting this profitable Invention; to which I own my self a great well-wisher, not out of any private Interest (tho that was obligingly proffer'd me by the* Patentees,) *but as I think the bringing it into general use may prove a real Service to Mankind, upon the Score of divers Utilities and Advantages, which yet, (tho I had leisure,) I should think very needless to enumerate to so discerning a Person as Dr.* B. *to whom I shall therefore hasten to subscribe my self,*

SIR,

A very Affectionate Friend,

and Humble Servant

R. BOYLE.

After so many forcible and convincing Testimonies in favour of this grand Design, I shall make an Addition of the Approbation of His Majesty of *Great Britain*; who after the publication of the first Impression, having seen the convincing Proofs of the healthful Quality of this Water, hath resolv'd to have the same to be made use of in all his Sea-port Garisons; The which he caus'd to be published by express Order, in several Gazetts, and particularly in that of *Munday, Novemb.* 5. 1683.

An

An ABSTRACT out of the Gazette, *Number* 1876.

Whitehall Novemb. 2. 1683. HIS Majesty vvas pleas'd to Command the Honourable Mr. *Boyle*, to attend Him to give His Majesty an Ocular Proof of the Nicety of his vvay of examining the Freshness and Saltness of Water, and to apply it to the Sea-Water, prepar'd according to the Patentees Invention; vvhich being done before his Majesty, his Royal Highness, and the Duke of *Grafton*, several Persons of Quality being also present, it vvas made apparent by a certain prepar'd Liquid vvhich Mr. *Boyle* had brought vvith him, that a Discovery could be made if there vvere so much as a thousandth part of Salt in a propos'd Water: By which Tryal His Majesty finding that the Prepar'd Sea-Water, for which He has granted His Royal Patent, was at least as free from Salt as the best Waters used in this Town; received such satisfaction as to the wholsomness of the said Water, that He was pleased to declare his Royal Intentions both to encourage the said Invention, and to have the said Water made use of in His several Maritime Garisons, which Nature has not furnished with wholsom Water.

A Copy of a Letter from Captain *Macdonnel*, from aboard his Majesties Ship the *Grey-hound*, near the Coast of *Spain*, to one of the Patentees of Sea-Water.

SIR,

FOR these Four Months past, I kept your Sea-Water (for its better Tryal) Buried in my Ships Hold, where, had it not been extraordinary good, it must infallibly have been of no use, and offensive, but I'll assure you it prov'd quite contrary; for yesterday, having several both of Sea and Land Officers on board of me, I made them insensibly taste of your Water, which I pretended to be from a Spring I watered my Ship at, Ten Leagues to the Southward of Sallie; *they all affirm'd it to be as good as* Tangier *Water, the very best counted in the* Streights, *but when I discovered the Water to be yours, they hardly would give it credit, and approv'd of it (as really it is, as good as can be drank) which they desired me to let you know.*

I am

Novemb. 3. 1683.

Your Humble Servant,

Rand. Macdonnel.

THe Gentlemen concern'd in this Grant, are the Honourable *Robert Fitz-Gerald*, Collonel *Oglethorp*, Mr. *Bridgeman*, Mr. *Thomas Maul*, and Mr. *Patrick Trant*, who intending the General Good as well as their Private Advantage in this Deſign, do intend as ſoon as theſe Papers be made publick, to agree with all ſuch as are willing to deal with them for the Inſtruments and Ingredients; which, concerning ſo nearly the Lives and Healths of Men, ſhall be carefully made up under ſuch ſure and private Marks, that it ſhall be very hard (if poſſible) to Counterfeit them.

If any Corporation, Body of People, or Private Perſons, are willing to be concern'd herein, they may pleaſe to direct their Letters to any of the Patentees before-mentioned, at the *Carolina Coffe-houſe* near the *Royal Exchange*, or at *Will's Coffe-houſe* in *Bow-ſtreet*, in *Covent-Garden*, or to Mr. *John Pye* in *Brook-ſtreet* near *Holbourn*, who is the Perſon appointed by the Patentees to receive ſuch Papers as are intended for them.

FINIS.